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The Impact of Changes  
within the West Virginia  
Poultry Industry  
over Three Time Periods—1945, 1957, 1968

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## SUMMARY AND CONCLUSIONS

The purpose of this study was to identify, describe, and measure the effect of changes in efficiency and technology on distribution of income in the broiler industry. In addition, an attempt was made to determine the impact of changes in broiler production and sales on the level of income and employment in a broiler producing community.

Three time periods (1945, 1957, and 1968) were used in the analysis. Secondary data and price indices were used to derive cost and return estimates for production, assembly, processing, and transportation of broilers produced in West Virginia. Type II multipliers developed previously by Bills and Barr were used to assess the impact of a given change in broiler sales on income and employment in a broiler producing area.

From 1945 to 1968 producer costs per pound of broiler decreased 42 per cent while assembly, processing, and transportation costs increased 26, 91 and 140 per cent, respectively.

Analysis of 1945 and 1968 returns showed the calculated hourly returns to producer and processing labor increased 17 and 281 per cent, respectively, compared to a 195 per cent increase in the average hourly wage for industry. Net income as a per cent of sales decreased 86 per cent for producers and increased 823 per cent for processors. This estimated increase for the processor is in the opposite direction from the percentage found by the National Commission on Food Marketing. The Commission's study indicated the net income as a per cent of sales for processors decreased 53 per cent from 1947 to 1964. Part of this difference may be related to the different years used in the calculations.

Although all costs analyzed, except production costs, increased between 1945 and 1968, the retail price of broiler meat dropped six per cent. This six per cent drop in retail price occurred concurrently with a 172 per cent increase in per capita income and a 556 per cent increase in per capita consumption of broiler meat in the United States. By 1968 the average worker in industry could buy one pound of broiler meat with wages earned in 16 minutes instead of the 46 minutes required in 1945.

Broiler sales in the South Branch Valley of West Virginia, the major broiler producing area in the State, decreased \$1,899,180 from 1957 to 1968. The use of a Type II multiplier estimated the impact of this decrease in sales to be a reduction of \$565,174 in household income and a loss of 292 jobs in the South Branch Valley. During the past two decades the broiler industry has become vertically integrated and new sources for chicks, feed, and other supplies have developed in the Valley. These changes were assumed to have reduced the degree of interdependency existing in the industry. If this is true, the \$1,899,180 decrease in sales which occurred between 1957 and 1968 would have had a greater impact on income and employment in the area had it occurred before 1957 when a greater degree of interdependency existed in the industry.

## THE AUTHORS

Robert L. Jack is Agricultural Economist; at the time of this study, Lynn A. Shaw was a Graduate Student in Agricultural Economics.

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# The Impact of Changes Within the West Virginia Broiler Industry Over Three Time Periods— 1945, 1957, 1968

ROBERT L. JACK and LYNN A. SHAW

The poultry industry is an important sector of the agricultural economy in the Northeast where poultry accounted for 23.7 per cent of the total cash farm receipts in 1970.<sup>1</sup>

In West Virginia poultry accounted for 21.5 per cent—and broilers accounted for 8.1 per cent—of the total cash farm receipts in 1970.<sup>2</sup> The only commodities accounting for larger proportions of the total cash farm receipts in the State than broilers were beef cattle, milk, eggs, and apples.<sup>3</sup>

Over the last 20 years the broiler industry has undergone rapid technological changes which may have caused a change in the distribution of income to the factors used in broiler production—land, labor, capital, and management. One objective of this study was to identify, describe, and measure the changes in distribution of income to factors of production as production efficiency increased and vertical integration occurred in the broiler industry of West Virginia. A second objective was to determine the impact of changes in the broiler industry on the level of income and employment in a broiler producing community.

## METHODOLOGY

Cost estimates for production, assembly, processing and distribution for broilers produced in West Virginia were prepared for 1945, 1957, and 1968. The estimates were derived using primary information, secondary data, recommended standards, and indices to update costs.

Data from these cost estimates and from secondary sources were used to determine the return to labor and net income per pound for producers and processors.

Multipliers developed in another study were used to determine the impact changes in the broiler industry have had on income and employment in communities where large volumes of broilers are produced.

<sup>1</sup>U.S. Department of Agriculture, *Farm Income, State Estimates, 1949-1970* (Washington: U.S. Government Printing Office, 1972), pp. 96-115.

<sup>2</sup>*Ibid.*

<sup>3</sup>*Ibid.*

## ANALYSIS OF DATA

**Production Costs** — Costs for producer inputs include feed, chicks, labor, fuel, repairs, and depreciation on buildings and equipment, transportation, return on investment, litter, electricity, and real estate and personal property taxes.

Cost estimates were derived for each thousand chicks started, for each broiler sold, and for each pound of liveweight produced.

A comparison of cost estimates for producing broilers during the three time periods shows how relative costs of inputs changed over time (Table 1). In 1945, total costs per pound of liveweight produced was 25 cents but decreased to 21 cents in 1957 and to 15 cents in 1968. All of this decrease was due to the

**TABLE 1**  
**Estimated Input Costs for Producing One Pound of**  
**Broiler Meat in West Virginia, 1945, 1957, and 1968<sup>a</sup>**

Cost Input	1945		1957		1968	
	Cents	%	Cents	%	Cents	%
Feed	16.7	66.7	13.9	65.9	9.0	61.9
Chicks	4.8	19.3	3.7	17.6	3.2	21.5
Labor	1.1	4.3	1.7	8.0	0.5	3.5
Fuel	0.9	3.7	0.6	2.9	0.5	3.1
Transportation	0.2	0.9	c	c	c	c
Litter	0.2	0.8	0.2	1.1	0.1	1.0
Electricity	b	0.2	0.1	0.6	0.1	0.8
Total variable costs	23.9	95.9	20.2	96.1	13.4	91.8
Repairs & depreciation on buildings	0.4	1.6	0.4	1.7	0.6	3.8
Repairs & depreciation on equipment	0.4	1.6	0.2	1.1	0.3	1.8
Return on investment	0.2	0.8	0.2	1.0	0.3	2.3
Real estate & personal property taxes	b	0.1	b	0.1	b	0.3
Total fixed costs	1.0	4.1	0.8	3.9	1.2	8.2
Total costs	25.0	100.0	21.0	100.0	14.6	100.0

<sup>a</sup>Taken from Appendix Tables A, B, and C.

<sup>b</sup>Less than 0.05 cents.

<sup>c</sup>Not derived for 1957 and 1968 since all transportation was furnished by the integrator.

decline in variable costs, mainly feed and chicks, which accounted for more than 80 per cent of total costs for the three time periods.

Feed cost as a percentage of total production costs decreased from 67 per cent in 1945 to 62 per cent in 1968. One reason for lower feed cost to produce a pound of broiler, even though feed prices increased, was the improvement in the feed conversion ratio which decreased from 4.4 to 1.9 pounds of feed per pound of broiler between 1945 and 1968.<sup>4</sup> This improved ratio is the result of better feed, improved management, lower mortality, and new strains of chicks developed especially for meat production. The data in Table 1 indicate that less progress has been made in cutting the cost of the chick than in cutting costs of feed, labor, or fuel.

Fixed costs as a percentage of total producer costs increased from 4.1 per cent in 1945 to 8.2 per cent in 1968. Variable costs per pound of broiler produced decreased for each time period studied and fixed costs per pound decreased from 1945 to 1957. However, by 1968 fixed costs were 20 per cent higher than in 1945. Thus, it appears that as new technology was adopted by the broiler industry total costs per pound of broiler produced decreased and fixed costs increased.

**Assembly Costs** — Cost estimates of assembling broilers for processing were determined for four West Virginia counties—Grant, Hampshire, Hardy, and Pendleton—since these four counties produced approximately 95 per cent of West Virginia's broilers in 1968. Using a density level (pounds of liveweight produced per square mile) for the four counties and density level cost tables derived from a previous study,<sup>5</sup> costs per pound of assembling broilers for processing were obtained for each time period (Table 2).

Density per square mile in the four-county area increased 170 per cent while assembly costs increased by only five per cent between 1945 and 1957. The efficiency gained by increased density almost offset the increase in cost of trucks, labor, gasoline, and materials used in assembling broilers. Between 1957 and 1968 the five per cent increase in density was not sufficient to offset the continued rise in the cost of trucks, labor, gasoline, and materials, causing assembly costs to rise.

**Processing Costs** — Estimates of processing costs were prepared for 1945, 1957, and 1968. Basic information for processing costs was obtained from a study by Donald and Bishop.<sup>6</sup> In their study they developed three model

<sup>4</sup>1970-71 *Poultry Management and Business Analysis Manual*, Cooperative Extension Service Bulletin 558 (University of Maine, University of New Hampshire, 1971).

<sup>5</sup>Clark R. Burbee, Edwin T. Bardwell, and William F. Henry, *Marketing New England Poultry: Effects of Firm Size and Production Density on Spatial Costs for an Integrated Broiler Marketing Firm*, Agricultural Experiment Station Bulletin 485 (Durham, New Hampshire: University of New Hampshire, 1964).

<sup>6</sup>James R. Donald and Charles E. Bishop, *Broiler Processing Costs*, Agricultural Economic Information Series No. 59, (Raleigh, North Carolina: North Carolina State College, 1957).

processing plants with outputs of 600; 2,400; and 4,800 broilers per hour. The model plants were developed using the most efficient technology known in 1957. Costs were derived from actual plant data and information obtained from companies that sold broiler processing equipment. The model plants processed a ready-to-cook, ice-packed product.

In this study for West Virginia, it was assumed that the processing labor worked 40 hours a week and 48 weeks a year. This schedule allowed time off for vacation and holidays. The number of broilers processed per man-hour of labor in a given size plant was the same for each time period. Where necessary, data were adjusted by building, equipment, and labor price indices.

Table 3 presents estimates for average variable costs, average fixed costs, and average total costs for processing outputs of 600; 2,400; and 4,800 broilers per hour for each of three time periods. Cost of the live bird is not included in the processing cost estimates. Cost per pound for packaging materials, uniforms, and miscellaneous costs were assumed to remain constant at different levels of output.

The estimates show that labor plus administration accounted for more than half of the total cost per pound of processing 600; 2,400; and 4,800 birds per hour for all three time periods.

Average total costs (the summation of average variable costs and average fixed costs) decreased approximately 19 per cent as plant capacity increased from 600 to 4,800 broilers per hour in each of the time periods examined. However, average total costs increased by approximately 91 per cent between 1945 and 1968 at all levels of output.

These data show that as processing plant capacity increases over the range of sizes examined, the average variable costs, average fixed costs, and the average

**TABLE 2**  
**Calculated Broiler Density and Assembly Costs in the**  
**Four-County Area of West Virginia, 1945, 1957, and 1968**

Item	1945	1957	1968
Density (pounds/square mile) <sup>a</sup>	8,236	22,243	23,437
Assembly cost (cents/pound) <sup>b</sup>	.508	.534	.638

<sup>a</sup>Derived using the following formula:

$$\text{Density} = \frac{\text{Total pounds produced in four-county area}}{\text{Square miles in four-county area}}$$

<sup>b</sup>Derived by interpolation from Appendix Tables E, F, and G.

total costs all decrease. The decreasing average costs for larger plant capacities indicate that economies of scale do exist in the broiler processing industry. Also fixed costs have increased relative to variable costs.

**Transportation Costs** — Transportation costs of moving dressed birds from processing plant to market were determined by inserting the average distance West Virginia broilers were transported to market into the formula taken from Brown.<sup>7</sup> The formula used was:  $Y_c = 46.67 + .1082X$ , where  $Y_c$  is estimated transportation cost and  $X$  is miles broilers were transported to market. The results were then multiplied by the transportation price index to adjust for change in price level in each time period.

From 1945 to 1957 transportation cost per pound rose 44 per cent even though the average distance West Virginia broilers were transported to market decreased 35 per cent (Table 4). Transportation cost increased from 1957 to 1968 by 66 per cent, but during this time the average distance the broilers were transported increased 36 per cent. Overall, the transportation costs rose by 140 per cent between 1945 and 1968 although the distance dressed birds were transported decreased 11 per cent.

**Wholesale and Retail Prices** — Weighted average wholesale and retail prices for broilers for the three time periods are presented in Table 5. These data show that wholesale price dropped 8 per cent from 1945 to 1957 and 21 per cent from 1957 to 1968. Since transportation, processing, and assembly costs all increased during these periods, the drop in wholesale prices was a direct result of the reduced farm prices which were related to lower production costs.

**Per Capita Income and Consumption** — Per capita consumption of broilers in the United States increased by almost 300 per cent between 1945 and 1957 but the proportion of per capita disposable income spent on broilers increased by only 50 per cent (Table 6). Between 1945 and 1968 the per capita consumption of broilers increased by approximately 550 per cent while the proportion of per capita disposable income spent on broilers increased by only 100 per cent. This favorable situation for consumers is shown even better by the hours of labor required by manufacturing employees to purchase one pound of broiler. In 1945 it took 0.76 hour, in 1957 it took 0.50 hour, and in 1968 it took 0.26 hour of labor to obtain enough income to purchase one pound of broiler in retail stores. Thus, the consumer was in a better position to purchase broilers in 1968 than he was in either 1945 or 1957.

## ANALYSIS OF RETURNS

Returns to factors of production used in different stages of production and marketing and in different time periods by the broiler industry are analyzed in this section.

<sup>7</sup>Alfred A. Brown, *Freight Rates and the Eastern Poultry Industry*, Agricultural Experiment Station Publication 533 (Amherst, Massachusetts: University of Massachusetts, 1963).

TABLE 3

Estimated Average Costs Per Pound for Processing Broilers in  
West Virginia for Three Levels of Output, 1945, 1957, and 1968<sup>a</sup>

Cost Item	Level of Output in Broilers Per Hour								
	1945				1957				
	600	2400	4800	600	2400	4800	600	2400	
Cents Per Pound									
<b>Average Variable Costs</b>									
Labor <sup>b</sup>	1.261	1.063	1.035	2.332	1.966	1.914	2.460	2.080	2.020
Water <sup>c</sup>	.108	.086	.081	.088	.087	.085	.085	.084	.081
Electricity <sup>d</sup>	.076	.059	.053	.079	.062	.055	.010	.009	.008
Fuel <sup>e</sup>	.026	.021	.020	.048	.040	.038	.049	.041	.039
Packaging materials <sup>f</sup>	.602	.602	.602	1.030	1.030	1.020	1.130	1.130	1.130
Repairs & maintenance <sup>g</sup>	.026	.023	.019	.050	.044	.037	.061	.053	.046
Uniforms <sup>h</sup>	.021	.021	.021	.031	.031	.031	.040	.040	.040
Miscellaneous <sup>i</sup>	.024	.024	.024	.041	.041	.041	.045	.045	.045
<b>Total</b>	2.144	1.899	1.855	3.699	3.301	3.221	3.880	3.482	3.409
Cents Per Pound									
<b>Average Fixed Costs</b>									
Interest on buildings <sup>j</sup>	.021	.026	.018	.041	.050	.034	.042	.052	.035
Interest on equipment <sup>k</sup>	.038	.028	.027	.073	.054	.052	.095	.071	.068
Depreciation <sup>l</sup>	.143	.115	.104	.278	.223	.203	.351	.278	.255
Taxes <sup>m</sup>	.010	.009	.007	.019	.017	.014	.023	.020	.017
Insurance <sup>n</sup>	.006	.005	.004	.011	.010	.009	.014	.012	.010
Administration <sup>o</sup>	.281	.172	.124	.449	.275	.198	.658	.403	.290
<b>Total</b>	.499	.355	.284	.871	.629	.510	1.183	.836	.675

<sup>a</sup>Most data derived from James R. Donald and Charles E. Bishop, *Broiler Processing Costs*, Agricultural Economic Information Series No. 59 (Raleigh, North Carolina: North Carolina State College, 1957). Data were updated or backdated through price indices as necessary.

<sup>b</sup>Derived as follows:

$$\text{Hourly wage rate} \div \text{Pounds of dressed broiler produced per man-hour}$$

<sup>c</sup>Time period adjustments for water cost were derived by multiplying water cost data from the North Carolina study by the price indices for water.

<sup>d</sup>Time period adjustments for electricity cost were derived by multiplying electricity cost data from the North Carolina study by the price indices for electricity.

<sup>e</sup>Time period adjustments for fuel cost were derived by multiplying fuel cost data from the North Carolina study by the price indices for fuel.

<sup>f</sup>Time period adjustments for packaging material cost were derived by multiplying packaging material cost data from the North Carolina study by the price indices for packaging material.

<sup>g</sup>Derived using 2 per cent of the construction value of buildings and 3 per cent of purchase value of equipment as determined for the North Carolina study and multiplying by building and machinery price indices. Two and three per cent are accepted values.

<sup>h</sup>Time period adjustments for uniforms cost were derived by multiplying uniforms cost data from the North Carolina study by the price indices for clothing.

<sup>i</sup>Time period adjustments for miscellaneous cost were derived by multiplying miscellaneous cost data from the North Carolina study by the wholesale price indices for all commodities.

<sup>j</sup>Derived using a 6 per cent rate of interest on calculated value of buildings for 1945, 1957, and 1968.

<sup>k</sup>Derived using a 6 per cent rate of interest on calculated value of equipment for 1945, 1957, and 1968.

<sup>l</sup>Derived using a 20-year life for buildings and a 5-year life for equipment, and dividing this into the original value of buildings and equipment for 1945, 1957, and 1968.

<sup>m</sup>Derived using 1 per cent of calculated value of buildings and equipment for 1945, 1957, and 1968.

<sup>n</sup>Derived using .6 per cent of calculated value of buildings and equipment for 1945, 1957, and 1968.

<sup>o</sup>Time period adjustments for administrative cost were derived by multiplying administrative cost data from the North Carolina study by the price indices for salaries.

**TABLE 4**  
**Estimated Transportation Cost from Processing Plants**  
**To Selected Wholesale Market Centers for Broilers**  
**Processed in West Virginia 1945, 1957, and 1968**

Item	1945	1957	1968
Average distance transported to market (miles)	368 <sup>a</sup>	241 <sup>b</sup>	328 <sup>c</sup>
Transportation cost (cents/lb.)	.45	.65	1.08

<sup>a</sup>All processed broilers were being transported to New York City.

<sup>b</sup>Sixty-three per cent of the processed broilers were being transported to Pittsburgh and 37 per cent to New York.

<sup>c</sup>Eighty-one per cent of the processed broilers were being transported to New York and 19 per cent to Pittsburgh.

**TABLE 5**  
**Estimated Wholesale and Retail Prices**  
**For Dressed Broilers, 1945, 1957, and 1968**

Type of Price	1945	1957	1968
Wholesale prices (cents/pound)	38.10 <sup>a</sup>	35.06 <sup>c</sup>	27.66 <sup>d</sup>
Retail prices (cents/pound)	42.4 <sup>b</sup>	46.9 <sup>c</sup>	39.8 <sup>e</sup>

<sup>a</sup>The 1945 wholesale price was computed from data taken from: *The Price and Production of Broilers*, Agricultural Experiment Station Bulletin No. 553 (Lafayette, Indiana: Purdue University, 1950) p. 8.

<sup>b</sup>The 1945 retail price was computed from data taken from: United States House of Representatives, *Problems in the Poultry Industry — Hearings Before Subcommittee No. 6 of the Select Committee on Small Business* (Washington: U.S. Government Printing Office, 1957) p. 13.

<sup>c</sup>The 1957 wholesale and retail prices were computed from data taken from: U.S. Department of Agriculture, *Price and Price Spread Statistics for Eggs, Frying Chickens, and Turkeys in Ten Cities, Monthly, 1956-61* (Washington: U.S. Government Printing Office, 1962).

<sup>d</sup>The 1968 wholesale price was computed from data taken from: U.S. Department of Agriculture, *Poultry Market Statistics, 1968* (Washington: U.S. Government Printing Office, 1969).

<sup>e</sup>The 1968 retail price was computed from data taken from: U.S. Department of Agriculture, *Poultry and Egg Situation* (Washington: U.S. Government Printing Office, 1970).

TABLE 6

Per Capita Disposable Income, Consumption, and Labor  
Required To Purchase One Pound of Broiler Meat  
In the United States, 1945, 1957, and 1968

Item	1945	1957	1968
Per capita disposable income (dollars)	1,075 <sup>a</sup>	1,798 <sup>b</sup>	2,933 <sup>c</sup>
Per capita consumption of broilers (pounds)	5.0 <sup>d</sup>	19.1 <sup>d</sup>	32.8 <sup>e</sup>
Proportion of per capita disposable income spent on broilers (per cent) <sup>f</sup>	.2	.3	.4
Labor required to purchase one pound of broiler at retail (hours) <sup>g</sup>	.76	.50	.26

<sup>a</sup>Per capita disposable income for 1945 was taken from: U.S. Department of Agriculture, *U.S. Food Consumption*, Statistical Bulletin No. 364 (Washington: U.S. Government Printing Office, 1965) p. 184.

<sup>b</sup>Per capita disposable income for 1957 was taken from: U.S. Bureau of the Census, *Statistical Abstract of the United States: 1960* (Washington: U.S. Government Printing Office, 1960) p. 305.

<sup>c</sup>Per capita disposable income for 1968 was taken from: U.S. Bureau of the Census, *Statistical Abstract of the United States: 1970* (Washington: U.S. Government Printing Office, 1970) p. 312.

<sup>d</sup>Per capita consumption of broilers for 1945 and 1957 was taken from: U.S. Department of Agriculture, *Egg and Poultry Statistics Through Mid-1961* (Washington: U.S. Government Printing Office, 1962) p. 6.

<sup>e</sup>Per capita consumption of broilers for 1968 was taken from: U.S. Department of Agriculture, *Selected Statistical Series for Poultry and Eggs Through 1968* (Washington: U.S. Government Printing Office, 1970) p. 20.

<sup>f</sup>To obtain the proportion of per capita disposable income spent on broilers, the cost per pound of broiler was multiplied by the per capita consumption of broilers and this figure was divided by the per capita disposable income for that time period.

<sup>g</sup>The amount of labor required to purchase one pound of broiler at retail was obtained by dividing the disposable income per hour worked into the retail price per pound for broiler during that time period.

In Table 7 all costs have been put on the same basis: costs per pound of processed broiler. This was accomplished by using a dressing percentage of 71.47 to change the costs per pound of liveweight to costs per pound of processed broiler.

In 1945, producers' cost of production as a percentage of retail price was 82.5 per cent, decreasing to 63 per cent in 1957. By 1968 this percentage had decreased further to 51.4 per cent. Other costs increased relative to total costs for each successive time period with the exception of assembly costs from 1945

TABLE 7

Estimated Costs and Prices per Processed Pound and as a Percentage of Retail Price by Production and Marketing Stages for the West Virginia Broiler Industry, 1945, 1957, and 1968

Stage of Industry	1945		1957		1968	
	Costs Per Processed Pound	Costs as a Proportion of Retail Price	Costs Per Processed Pound	Costs as a Proportion of Retail Price	Costs Per Pound	Costs as a Proportion of Retail Price
Producer <sup>a</sup>	34.980	82.5	29.551	63.0	20.470	51.4
Assembly <sup>b</sup>	.711	1.7	.747	1.6	.949	2.4
Processing @4800/hr <sup>c</sup>	2.139	5.0	3.741	8.0	4.084	10.3
Transportation <sup>d</sup>	.450	1.1	.646	1.4	1.076	2.7
Estimated total cost to wholesale <sup>e</sup>	38.280	90.3	34.685	74.0	26.579	66.8
Wholesale price <sup>f</sup>	38.100		35.060		27.661	
Retail price <sup>g</sup>	42.4		46.9		39.8	

<sup>a</sup>Taken from Table 1 and converted to processed costs using a dressing percentage of 71.47.

<sup>b</sup>Taken from Table 2 and converted to processed costs using a dressing percentage of 71.47.

<sup>c</sup>Taken from Table 3.

<sup>d</sup>Taken from Table 4.

<sup>e</sup>Includes production, assembly, processing, and transportation costs.

<sup>f</sup>Taken from Table 5.

to 1957 (Table 7). In 1945 the summation of costs through the transportation stage were slightly greater than the estimated cost to wholesalers. There are several reasons why this could have happened. One explanation is that the costs and wholesale prices are estimates. Another reason is that the cost and price estimates are close enough that a rounding error could make the difference. Yet another explanation is that the prices reported in 1945 may have been influenced by the price control mechanism set up during World War II.

**Producers' Returns and Their Allocation Among Resources** — A comparison of prices received and production costs for different time periods does not give a complete picture of the broiler producers' income situation. In order to examine the producers' position for a specific time period relative to other periods a return to labor was computed.

Estimated returns to producer labor decreased from \$1.45 per hour worked in 1945 to a net loss of \$.15 per hour in 1957 (Table 8). The hourly returns to labor had increased to \$1.70 by 1968. The increased returns probably resulted from increased efficiency gained as new technology was adopted by the industry after 1957. However, when these hourly returns are compared to those received in the manufacturing industry for the same time periods the \$1.45 per hour for producers compares favorably to the \$1.02 per hour in 1945 for industry. The \$.15 loss of course compares unfavorably with the \$2.07 per hour for industry in 1957 and the \$1.70 per hour for producers also compares unfavorably with the \$3.01 per hour received in 1968 by workers in the manufacturing industry (Table 8).

Another means of comparing the producers' position in the different time periods is to calculate net income as a per cent of sales. In 1945 this estimated figure was 10.1 per cent, in 1957 it was -9.9 per cent, and in 1968 it was 1.4 per cent (Table 9).

The high net income figures in 1945 (Table 9) would have been expected to attract new producers to the industry and encourage existing producers to expand output. This action would result in increased production of broilers in West Virginia and put downward pressure on prices received by producers. From 1945 to 1957, production of broilers in West Virginia did triple while prices received by farmers dropped to a point below the cost of production.

**Processing Labors' Returns** — The calculated return to processing labor per hour increased in each time period, going from 78 cents per hour in 1945 to \$2.08 per hour in 1957 and to \$2.97 per hour by 1968 (Table 10). This comparison of hourly returns indicates that the position of labor in the broiler processing industry improved during each time period. However, the 78 cents per hour generated in 1945 was unfavorable compared with the \$1.02 received in the manufacturing industry (Table 8). In 1957 the \$2.08 per hour return was almost equal to the \$2.07 per hour wage in the manufacturing industry. And in 1968 the \$2.97 per hour return was slightly under the \$3.01 per hour wage rate

**TABLE 8**  
**Producers' Labor Requirements and Return to Labor,  
1945, 1957, and 1968**

Item	1945	1957	1968
Labor required per pound of broiler sold (hours) <sup>a</sup>	.027	.023	.004
Price per pound of broiler received by producer (cents) <sup>b</sup>	27.8	19.1	14.8
Returns per hour worked (dollars) <sup>c</sup>	1.45	- 15	1.70
Manufacturing wages (dollars) <sup>d</sup>	1.02	2.07	3.01

<sup>a</sup>Derived by the following formula:

$$\left( \frac{\text{Hours of labor required per 1,000 broilers started}}{\div} \frac{\text{Broilers sold per 1,000 started}}{\div} \right) \div \text{Average weight of live broiler} = \text{Labor required per pound of broiler sold.}$$

<sup>b</sup>Taken from West Virginia Department of Agriculture, West Virginia Crop Reporting Service, *1969 West Virginia Agricultural Statistics*, C. R. Bulletin No. 8 (Charleston, West Virginia: West Virginia Department of Agriculture, 1968) p. 32.

<sup>c</sup>Derived by the following formula:

$$\frac{1 \text{ Hour}}{\text{Hours of labor to produce one pound of broiler}} \times \left( \frac{\text{Price producer received per pound}}{\text{Production cost per pound (excluding labor)}} - \right) = \text{Returns per hour worked.}$$

<sup>d</sup>Taken from U.S. Bureau of the Census, *Statistical Abstract of the United States: 1969* (Washington: U.S. Government Printing Office, 1969) p. 223.

**TABLE 9**  
**Estimated Producers' Net Income Per Pound Sold,  
And as a Percentage of Sales, 1945, 1957, and 1968**

Item	1945	1957	1968
Net income per pound sold (cents) <sup>a</sup>	2.8	-1.9	0.2
Net income as a proportion of sales (per cent) <sup>b</sup>	10.1	-9.9	1.4

<sup>a</sup>Derived by subtracting total costs from total income per pound of broiler sold.

<sup>b</sup>Derived by dividing net income per pound sold by the price per pound the producer received.

**TABLE 10**  
**Labor Return in Broiler Processing,**  
**1945, 1957, and 1968**

Item	1945	1957	1968
Broilers processed per hour of labor (pounds) <sup>a</sup>	90.62	90.62	98.69
Price per pound of broiler received by processor (cents) <sup>b</sup>	37.65	34.41	26.58
Return per hour of labor (dollars) <sup>c</sup>	\$0.78	\$2.08	\$2.97

<sup>a</sup>Derived by the following formula:

$$\left( \frac{\text{Hourly Output of Processed Broilers}}{\text{Number of Workers}} \right) \times \text{Average Dressed Weight} = \text{Pounds of broiler processed per man hour.}$$

<sup>b</sup>Wholesale price in major distribution centers (Table 5) less transportation from processing plant to such centers (Table 4).

<sup>c</sup>Derived by the following formula:

$$\text{Pounds of broiler processed per hour of labor} \times \left( \frac{\text{Price processor received per pound}}{\text{Processing costs (excluding labor)}} \right) = \text{Return per hour of labor.}$$

in the manufacturing industry. These comparisons suggest that the position of processing labor improved to 1957 but then stayed relatively constant to 1968. However, the actual wage received by processing labor may have been different from the calculated returns used in these comparisons.

**Processors' Returns and Their Allocation Among Resources** — The processors' position in each time period relative to other periods and relative to people in other industries was determined. Although the price paid per pound of broiler to the producer decreased (Table 8), assembly costs increased (Table 7), and the price processors received per pound of processed broiler decreased in each time period, it cannot be concluded from this information alone that the processor was in a less profitable position in 1968 than he was in 1945 or 1957.

A comparison of net income as a per cent of sales gives knowledge of the processors' relative position for the three time periods studied. In 1945 the calculated processors' net income as a per cent of sales was -0.47 per cent, in 1957 it was 1.1 per cent, and in 1968 the figure was 3.7 per cent for an output of 4,800 broilers per hour (Table 11). This comparison of net income to sales also indicates that the processors probably were in a better position in 1968 than in either 1945 or 1957. In comparing these results with a study made for the

TABLE 11  
Estimated Processors' Net Income Per Pound Processed<sup>a</sup>  
And as a Per Cent of Sales, 1945, 1957, and 1968

Item	1945	1957	1968
Net income per pound processed (cents) <sup>b</sup>	-.180	.375	.982
Net income as a proportion of sales-this study (per cent) <sup>c</sup>	-.47	1.1	3.7
Net income as a proportion of sales commission's study (per cent) <sup>d</sup>	1.5	1.0	0.7

<sup>a</sup>At 4,800 broilers per hour output.

<sup>b</sup>Derived by subtracting estimated total cost to wholesale from wholesale price, Table 7.

<sup>c</sup>Derived by dividing net income per pound by the price per pound of broiler received by processor, Table 10.

<sup>d</sup>The years used were 1947, 1957, and 1964. See footnote 11 in the Commission's study.

National Commission on Food Marketing,<sup>8</sup> the results obtained were similar for 1957 when processors' net income after taxes as a per cent of sales was 1.0 compared to 1.1 per cent in this study.

The Commission's findings began with 1947 and for that year net income as a per cent of sales was 1.5 per cent compared to this study's -0.47 per cent for 1945. For 1964, the last year reported, the Commission's report showed a percentage of 0.7 compared to this study's 3.7 per cent for 1968. The percentages for 1957 were very close. The percentages for 1968 from this study were much higher than those reported by the Commission for 1964. One reason for this discrepancy might have been the four years difference in dates plus the fact that taxes<sup>9</sup> were not deducted before the computation in this study whereas they were deducted in the Commission's study.

In summary, this study shows that the returns for producers' labor were higher in 1945 and 1968 than in 1957. In 1957 many producers lost enough money to cause them to leave the broiler producing business. Returns to producer labor, when compared with manufacturing wages, were more favorable in 1945 than in either 1957 or 1968, with 1957 being the most unfavorable period.

<sup>8</sup>National Commission on Food Marketing, *Organization and Competition in the Poultry and Egg Industries*, Technical Study No. 2 (Washington: U.S. Government Printing Office, 1966).

<sup>9</sup>Assumed to be corporate income taxes although the study did not state this.

Estimates of net income as a proportion of sales showed that the processors' position over the years has improved. Returns to labor used in processing were 78 cents per hour in 1945. In 1957 the returns to labor in processing were good compared to returns to labor in other sectors of the economy. By 1968 the return to labor was still favorable relative to other sectors. In general, the processor and the labor used in processing appear to have benefited from the changes which have occurred in the broiler industry since 1945, while the producers have lost ground.

## IMPACT ON THE COMMUNITY

### CHANGES IN BROILER PRODUCING COMMUNITY

The objective of this section is to estimate the impact of broiler production and sales on the level of income and employment in a broiler producing area in West Virginia. The production area selected for analysis is composed of Grant, Hampshire, Hardy, and Pendleton counties. These four counties produced 6,000,000 broilers or 73 per cent of the total broiler production in the State in 1945; 16,200,000 broilers or 64 per cent in 1957; and 15,600,000 broilers or 94 per cent in 1968 (Table 12). According to the 1969 Census of Agriculture broilers accounted for approximately 33 per cent of the total market value of all agricultural products sold in this four-county area (Figure 1).

### DEVELOPMENT OF MULTIPLIERS

Bills and Barr<sup>10</sup> in a 1968 study derived income and employment multipliers for sectors of the economy in the Upper South Branch Valley of West Virginia, which included Grant, Hardy, and Pendleton counties. In this study the Type II multipliers accounted for direct, indirect, and induced changes in income and employment. The direct changes represent estimates of the initial impact of a one dollar change in final demand on household income and employment. Indirect changes represent output adjustments necessary by local (endogenous) sectors to directly and indirectly support the change in deliveries to final demand. Induced changes result from changes in household purchases of locally produced goods and services as a result of a change in household income.<sup>11</sup>

Bills and Barr determined the direct change in household income per dollar change in the output for the agricultural sector to be \$.16351. The Type II income multiplier they derived for the agricultural sector of the Upper South Branch Valley economy was 1.82. This Type II multiplier estimates that a dollar

<sup>10</sup>Nelson L. Bills and Alfred L. Barr, *An Input-Output Analysis of the Upper South Branch Valley of West Virginia*, Agricultural Experiment Station Bulletin 568T (Morgantown, West Virginia: West Virginia University, 1968).

<sup>11</sup>*ibid.*

**TABLE 12**  
**Broiler Production and Income for a Four-County  
 Area of West Virginia, 1945, 1957, and 1968**

Item	1945	1957	1968
Broilers produced (pounds in liveweight) <sup>a</sup>	19,800,000 <sup>b</sup>	53,460,000 <sup>c</sup>	56,160,000 <sup>d</sup>
Gross income to producers (dollars) <sup>e</sup>	5,504,400	10,210,860	8,311,680
Net income to producers (dollars) <sup>f</sup>	554,400	-1,015,740	112,320

<sup>a</sup>Derived from U.S. Bureau of the Census, *Census of Agriculture, 1945, 1959, 1960* (Washington: U.S. Government Printing Office, 1947, 1961, 1972).

<sup>b</sup>The number of broilers in the four-county area as a percentage of total West Virginia broiler production was determined for 1944. Total broilers produced in West Virginia in 1945 was then multiplied by this percentage to derive the number of broilers in the four-county area in 1945. This figure was then multiplied by the average weight of broilers in 1945 (3.3 pounds).

<sup>c</sup>The number of broilers in the four-county area as a percentage of total West Virginia broiler production was determined for 1959. Total broilers produced in West Virginia in 1957 was then multiplied by this percentage to derive the number of broilers in the four-county area in 1957. This figure was then multiplied by the average weight of broilers in 1957 (3.3 pounds).

<sup>d</sup>The number of broilers in the four-county area as a percentage of total West Virginia broiler production was determined for 1969. Total broilers produced in West Virginia in 1968 was then multiplied by this percentage to derive the number of broilers in the four-county area in 1968. This figure was then multiplied by the average weight of broilers in 1968 (3.6 pounds).

<sup>e</sup>Derived by multiplying pounds of broilers produced by the average price per pound received by the producer.

<sup>f</sup>Derived by the following formula:

$$\text{Net income to producers} = \text{Gross income to producers} - \left( \frac{\text{Pounds of broiler produced}}{\text{Estimated total cost of producing a pound of broiler}} \right)$$

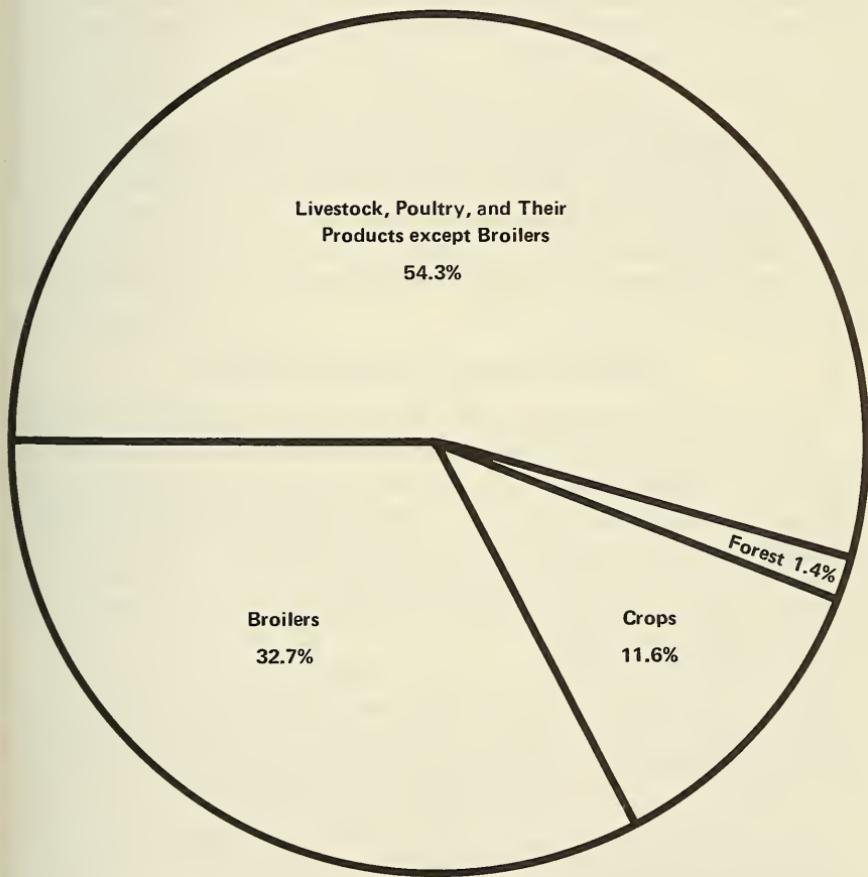
change in output in the agricultural sector of the South Branch Valley will cause a total (direct + indirect + induced) change in household income of approximately 30 cents<sup>12</sup> (.16351 X 1.82).

Bills and Barr determined the direct change in employment per \$1,000 change in output to be approximately .11057 man-equivalents. The Type II employment multiplier derived for agriculture was 1.39. This Type II multiplier estimates that a \$1,000 change in output in the agricultural sector will cause a total (direct + indirect + induced) change in employment of approximately .15 man-equivalents (.11057 X 1.39).

<sup>12</sup>*ibid.*

As shown in Figure 1 broilers accounted for approximately 33 per cent of the total market value of all agricultural products sold in this four-county area in 1969. Since broilers account for such a large percentage of the total market value, the agricultural sector of the economy will be influenced by the broiler industry in that area. This influence exerted by broilers should be reflected in the multipliers which Bills and Barr derived for the agricultural sector. Although the authors of the Upper South Branch Valley study stated that their study may

**FIGURE 1**  
**DISTRIBUTION OF TOTAL MARKET VALUE TO**  
**AGRICULTURAL SECTORS IN A**  
**FOUR-COUNTY AREA<sup>1</sup> OF WEST VIRGINIA, 1969**



<sup>1</sup>Counties include Grant, Hampshire, Hardy, and Pendleton.

have had some shortcomings, it is the only input-output study available for the broiler producing area. For these reasons the Type II multipliers for the agricultural sector from the study by Bills and Barr were used to obtain an estimate of the impact on income and employment that changes in the broiler industry may have exerted on the economy of the four-county area.

Income and employment multipliers for broiler production in West Virginia or for agriculture in the Upper South Branch Valley of West Virginia have not been derived for 1945 or 1957 and such derivation is beyond the scope of this study. However, some generalizations can be made about the size of the multipliers in these time periods for broiler production in West Virginia. In 1945 about half of the broiler producers in the four-county area purchased their chicks locally,<sup>13</sup> while in 1968 less than 20 per cent of the broiler chicks were purchased in West Virginia.<sup>14</sup> In 1972 no commercial broiler chick hatcheries were operating in West Virginia, thus all broiler chicks were purchased out-of-state. In the forties and fifties, hatcheries that produced chicks contracted with farmers to provide hatching eggs. With the decline in hatcheries, these farmers no longer have local hatcheries to buy hatching eggs. The amount of feed required to produce one pound of broiler decreased between 1945 and 1968. The broiler industry which was labor intensive in 1945 and 1957 was capital intensive by 1968. In general most of the inputs used in broiler production in 1945 and 1957, except feed and equipment, were obtained from outlets within the area or state, while in 1968 many of the inputs were obtained from outlets outside the local economy.

### IMPACT ON INCOME AND EMPLOYMENT

These changes in the production of chicks, feed usage, labor, and number of hatcheries have caused money for these inputs, which once circulated in the local area, to be spent outside the community. Furthermore, the above changes indicate that the broiler industry in 1945 and 1957 had greater structural interdependence with respect to local input purchases than it had in 1968. This greater independence would suggest that the income and employment multipliers for 1945 and 1957 were probably larger than the same multipliers Bills and Barr calculated for 1968.

Data in Table 12 showed a net income of \$554,400 for West Virginia broiler producers in 1945—the highest net income year of the periods examined—while in 1957 producers were operating at a loss of \$1,015,740. However, the highest gross income year for the producers was in 1957 and the lowest year in 1945.

<sup>13</sup>Jas. H. Clarke, *The Broiler Industry in West Virginia*, Agricultural Experiment Station Bulletin 338 (Morgantown, West Virginia: West Virginia University, 1949) p. 9.

<sup>14</sup>West Virginia Department of Agriculture, West Virginia Crop Reporting Service, 1969 *West Virginia Agricultural Statistics*, C. R. Bulletin No. 8 (Charleston, West Virginia: West Virginia Department of Agriculture, 1969) p. 37.

From 1957 to 1968 gross income from broiler sales in the State declined \$1,899,180 (Table 13). This decline in gross income between 1957 and 1968 was multiplied by Bills' and Barr's coefficient (.16351) for direct change in income per dollar change in gross output for the agricultural sector. A direct loss in household income between 1957 and 1968 of \$310,535 was derived. By multiplying this direct loss by the Type II income multiplier, a direct, indirect, and induced loss in household income of \$565,174 for the four-county area was obtained. Since the multipliers are believed to have been larger for 1945 and 1957 than they were in 1968, the same decrease of \$1,899,180 in gross income in 1945 or 1957 would have resulted in an even greater loss in total household income than occurred in 1968.

Changes in gross income between 1957 and 1968 as determined in this study were multiplied by Bills' and Barr's coefficient for direct change in employment per \$1,000 change in gross output for the agricultural sector. A

TABLE 13  
Direct, Indirect, and Induced Changes in Income and Employment in a Four-County Area of West Virginia

Item	1945 to 1957	1957 to 1968
Change in gross income from sale of broilers (dollars) <sup>a</sup>	4,706,460	-1,899,180
Income		
Direct change to households (dollars) <sup>b</sup>		-310,535
Direct, indirect, and induced changes to households (dollars) <sup>c</sup>		-565,174
Employment		
Direct change (man-equivalents) <sup>d</sup>		-210
Direct, indirect, and induced changes (man-equivalents) <sup>e</sup>		-292

<sup>a</sup>Derived from Table 12.

<sup>b</sup>Derived by multiplying Bills' and Barr's coefficient for direct change in income (.16331) by the change in gross income from sale of broilers.

<sup>c</sup>Derived by multiplying Bills' and Barr's Type II income multiplier (1.82) by the direct change in household income.

<sup>d</sup>Derived by multiplying Bills' and Barr's coefficient for direct change in employment (.11057) by the change in thousands of dollars of gross income from sale of broilers.

<sup>e</sup>Derived by multiplying Bills' and Barr's Type II employment multiplier (1.39) by the direct change in employment.

direct loss in employment between 1957 and 1968 of 210 man-equivalents was derived. By multiplying this direct loss by the Type II employment multiplier, a direct, indirect, and induced loss in employment of 292 man-equivalents for the four-county area was obtained. Since the multipliers are believed to have been larger for 1945 and 1957 than they were in 1968, the same decrease of \$1,899,180 in gross income in 1945 and 1957 would have resulted in an even greater loss in employment than in 1968.

The broiler industry in West Virginia was not as large in 1968 as it was in 1957, and as a percentage of agricultural income did not play as important role in the economy of the four-county area in West Virginia in 1968 as it did in 1945 or 1957. The changes in technology and costs and returns to the industry have decreased the broiler industry's impact and importance in the West Virginia economy.

The preceding discussion suggests that changes in the broiler industry which occurred between 1945 and 1968 caused more leakage and thus weakened the interdependency between various segments of the local economy and the broiler industry, thus reducing the size of the income and employment multipliers. When these smaller multipliers were applied to a given dollar change in output in the broiler industry, the results indicated a smaller impact on income and employment in a broiler producing area in 1968 than in either 1945 or 1957.

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# **Appendix**



Cost Item	Costs per		
	1,000 Chicks Started	Broiler Sold	Pound of Broiler Sold
	(dollars)	(cents)	(cents)
Feed	477.98 <sup>b</sup>	55.2	16.7
Chicks	138.66	16.0	4.8
Man labor	30.96 <sup>c</sup>	3.6	1.1
Fuel	26.74	3.1	.9
Repairs and depreciation on bldg.	11.46	1.3	.4
Repairs and depreciation on equip.	11.25	1.3	.4
Transportation	6.61 <sup>d</sup>	.8	.2
Interest on investment	5.98 <sup>e</sup>	.7	.2
Litter	5.82	.7	.2
Electricity	1.24	.1	.f
Real estate and personal property taxes	.69	.1	.f
Total costs	717.39	82.9	25.0
			100.0

<sup>a</sup>Clarke, James H., *The Broiler Industry in West Virginia*, Bulletin 338, May 1949, West Virginia Agricultural Experiment Station.

<sup>b</sup>Includes costs of medicine and disinfectants which amounted to 1 per cent or less of this figure when it was possible to separate them. Also includes a hauling charge of 10 cents per 100 pounds. This, however, is offset in most instances by a credit of 10 cents per empty bag returned.

<sup>c</sup>Computed at 40 cents per hour which was the prevailing rate for day labor in the area.

<sup>d</sup>Includes use of both auto and truck for broiler enterprise. Part of transportation expense is combined with feed cost. Some producers had no direct transportation expense.

<sup>e</sup>Computed at 6 per cent on half the original investment in buildings and equipment.

<sup>f</sup>Less than 0.05 cent.

APPENDIX TABLE B  
Estimated Input Costs for Producing Broilers  
In West Virginia, 1957

Cost Item	Costs per			Per Cent of Total <sup>c</sup>
	1,000 Chicks Started	Broiler Sold <sup>a</sup>	Pound of Broiler Sold <sup>b</sup>	
Feed				
Chicks	444.31 <sup>d</sup>	45.90	13.91	65.9
Man labor	119.00 <sup>e</sup>	12.29	3.72	17.6
Fuel	54.02 <sup>f</sup>	5.58	1.69	8.0
Repairs and depreciation on bldg.	19.45 <sup>g</sup>	2.01	.61	2.9
Repairs and depreciation on equip.	11.09 <sup>h</sup>	1.15	.35	1.7
Return on investment	7.32 <sup>i</sup>	.76	.23	1.1
Litter	6.95 <sup>j</sup>	.72	.22	1.0
Electricity	7.31 <sup>k</sup>	.76	.23	1.1
Real estate and personal property taxes	4.01 <sup>l</sup>	.41	.13	0.6
Total costs	674.28	69.66	21.12	100.0

<sup>a</sup>Richard F. Saunders, *Contract Broiler Growing in Maine*, Agricultural Experiment Station Bulletin 571 (Orono, Maine: University of Maine, 1958) p. 20. The mortality rate in 1957 was 3.2 per cent. The cost per broiler sold was determined in the following manner: Cost per 1,000 chicks started  $\div$  (1,000 - mortality).

<sup>b</sup>West Virginia Department of Agriculture, West Virginia Crop Reporting Service, *West Virginia Poultry Statistics - Trends 1924 - 1959*, C. R. Bulletin No. 2 (Charleston, West Virginia: West Virginia Department of Agriculture, 1959) p. 13. The average weight of the live broiler at sale in West Virginia in 1957 was 3.3 lbs. The cost per pound of broiler sold was determined in the following manner: Cost per broiler sold  $\div$  live weight of broiler at sale.

<sup>c</sup>Determined by dividing cost per pound of broiler sold for each item by total cost per pound of broiler sold.  
<sup>d</sup>West Virginia Department of Agriculture, West Virginia Crop Reporting Service, *West Virginia Agricultural Statistics*, C. R. Bulletin No. 4 (Charleston, West Virginia Department of Agriculture, 1963) p. 56.  
<sup>e</sup>U.S. Department of Agriculture, *Egg and Poultry Statistics Through 1957*, (Washington: U.S. Government Printing Office, 1959) p. 57.  
<sup>f</sup>Saunders, *op. cit.*, p. 34.

<sup>g</sup>West Virginia Poultry Association, "Your Key To Broiler Profits," mimeograph Committee Report, 1959, p. 8.

<sup>h</sup>Repairs computed at 1½ per cent of the original value of building. Depreciation computed at 5 per cent of the original value of building.

<sup>i</sup>Repairs computed at 2 per cent of the original value of equipment. Depreciation computed at 10 per cent of the original value.

<sup>j</sup>Computed at 6 per cent on half the original investment in building and equipment.

<sup>k</sup>West Virginia Poultry Association, *op. cit.*

<sup>l</sup>Harold W. Gaede and Robert L. Christensen, "Economic Interrelationships of the Poultry Industry with Other Sectors of the Economy: New England," mimeograph report, 1971, p. 26.

<sup>m</sup>Clifford G. Lantz, *Thirty-Second Biennial Report Tax Commissioner West Virginia: 1967-1968*, p. 736.

APPENDIX TABLE C  
Estimated Input Costs for Producing Broilers  
In West Virginia, 1968

Cost Item	Costs per			Per Cent of Total <sup>c</sup>
	1,000 Chicks Started	Broiler Sold <sup>a</sup>	Pound of Broiler Sold <sup>b</sup>	
	(dollars)	(cents)	(cents)	
Feed	315.88 <sup>d</sup>	32.56	9.05	61.9
Chicks	110.00 <sup>e</sup>	11.34	3.15	21.5
Man labor	17.94 <sup>f</sup>	1.85	.51	3.5
Fuel	16.00 <sup>g</sup>	1.65	.46	3.1
Repairs and depreciation on bldg.	19.50 <sup>h</sup>	2.01	.56	3.8
Repairs and depreciation on equip.	9.57 <sup>i</sup>	.99	.27	1.8
Return on investment	11.39 <sup>j</sup>	1.17	.33	2.3
Litter	5.00 <sup>k</sup>	.52	.14	1.0
Electricity	4.25 <sup>l</sup>	.44	.12	0.8
Real estate and personal property taxes	1.44 <sup>m</sup>	.15	.04	0.3
Total costs	510.97	52.68	14.63	100.0

<sup>a</sup>1970-71 *Poultry Management and Business Analysis Manual* Cooperative Extension Service Bulletin 558 (University of Maine, University of New Hampshire, 1971). The mortality rate for 1968 was 3.0 per cent. The cost per broiler sold was determined in the following manner. Cost per 1,000 chicks started  $\div$  (1,000 - mortality).

<sup>b</sup>West Virginia Department of Agriculture, West Virginia Crop Reporting Service, 1969 *West Virginia Agricultural Statistics*, C. R. Bulletin No. 8 (Charleston, West Virginia: West Virginia Department of Agriculture, 1969) p. 32. The average weight of the broilers at sale in West Virginia in 1968 was 3.6 lbs. The cost per pound of broiler sold was determined in the following manner: Cost per broiler sold  $\div$  live weight of broiler at sale.

<sup>c</sup>Determined by dividing cost per pound of broiler sold for each item by total cost per pound of broiler sold.

<sup>d</sup>West Virginia Department of Agriculture, *op. cit.*, p. 50.

<sup>e</sup>U.S. Department of Agriculture, Statistical Reporting Service, Crop Reporting Board, *Agricultural Prices, 1968 Annual Summary* (Washington: U.S. Government Printing Office, 1969) p. 171.

<sup>f</sup>1970-71 *Poultry Management and Business Analysis Manual*, *op. cit.*, p. 17.

<sup>g</sup>*Poultry Handbook*, cited by Raymond L. Orndorff, Jr., *Housing and Equipment Needs for Broilers in West Virginia* (unpublished Master's problem, West Virginia University, Morgantown, 1968), p. 29.

<sup>h</sup>Repairs computed at 1½ per cent of the original value of building. Depreciation computed at 5 per cent of the original value of building.

<sup>i</sup>Repairs computed at 2 per cent of the original value of equipment. Depreciation computed at 10 per cent of the original value of equipment.

<sup>j</sup>Computed at 6 per cent on half the original investment in building and equipment.

<sup>k</sup>Harold W. Gaede and Robert L. Christensen, "Economic Interrelationships of the Poultry Industry with Other Sectors of the Economy: New England," mimeograph Report, 1971, p. 24.

*Ibid.*

<sup>m</sup>Clifford G. Lantz, *Thirty-Second Biennial Report Tax Commissioner of West Virginia: 1967-1968*, p. 736.

## APPENDIX TABLE D

Broiler Assembly Costs in Cents Per Pound of Live  
Broiler for Six Firm Sizes at Three Density Levels,  
1964<sup>a</sup>

Firm	Truck	Labor	Crate	Car	Mgt.	Shrink	Total
<i>1,000-Pound Density Level</i>							
A	.147	.328	.014	.028	.038	.326	.88
B	.177	.335	.012	.028	.028	.375	.95
C	.230	.405	.012	.043	.022	.417	1.12
D	.249	.481	.012	.057	.021	.435	1.25
<i>5,000-Pound Density Level</i>							
A	.099	.244	.014	.012	.038	.230	.637
B	.104	.253	.013	.008	.028	.241	.647
C	.133	.274	.012	.010	.022	.276	.727
D	.151	.287	.012	.013	.021	.299	.783
E	.163	.315	.012	.018	.019	.327	.854
F	.183	.333	.012	.022	.019	.350	.919
<i>25,000-Pound Density Level</i>							
A	.084	.200	.011	.005	.038	.179	.517
B	.063	.205	.010	.003	.028	.228	.537
C	.072	.216	.011	.004	.022	.218	.547
D	.075	.217	.011	.004	.021	.229	.557
E	.085	.229	.012	.007	.019	.248	.600
F	.098	.240	.013	.009	.019	.275	.657

<sup>a</sup>Taken from Clark R. Burbee, Edwin T. Bardwell, and William F. Henry, *Marketing New England Poultry: Effects of Firm Size and Production Density on Spatial Costs for a Integrated Broiler Marketing Firm*, Agricultural Experiment Station Bulletin 485 (Durham, New Hampshire: University of New Hampshire, 1964), p. 11.

**APPENDIX TABLE E**  
**Estimated Broiler Assembly Costs in Cents Per Pound**  
**Of Live Broiler for Six Firm Sizes at Three Density**  
**Levels, 1945<sup>a</sup>**

Firm	Truck	Labor	Crate	Car	Mgt.	Shrink	Total
<i>1,000-Pound Density Level</i>							
A	.071	.171	.007	.013	.020	.326	.608
B	.085	.174	.006	.013	.015	.375	.668
C	.110	.211	.006	.021	.011	.417	.776
D	.120	.250	.006	.027	.011	.435	.849
Average							.725
<i>5,000-Pound Density Level</i>							
A	.048	.127	.007	.006	.020	.230	.438
B	.050	.132	.007	.004	.015	.241	.449
C	.064	.142	.006	.005	.011	.276	.504
D	.072	.149	.006	.006	.011	.299	.543
E	.078	.164	.006	.009	.010	.329	.594
F	.088	.173	.006	.011	.010	.350	.438
Average							.528
<i>25,000-Pound Density Level</i>							
A	.040	.104	.006	.002	.020	.179	.351
B	.030	.107	.005	.001	.015	.228	.386
C	.035	.112	.006	.002	.011	.218	.384
D	.036	.113	.006	.002	.011	.229	.397
E	.041	.119	.006	.003	.010	.248	.427
F	.047	.125	.006	.004	.010	.275	.467
Average							.402

<sup>a</sup>Computed using data from Appendix Table D and back-dating the data using motor vehicle, labor, and building material price indices from *Agricultural Prices, 1967 Annual Summary* (Washington: U.S. Government Printing Office, 1968).

**APPENDIX TABLE F**  
**Estimated Broiler Assembly Costs in Cents Per Pound**  
**Of Live Broiler for Six Firm Sizes at Three Density**  
**Levels, 1957<sup>a</sup>**

Firm	Truck	Labor	Crate	Car	Mgt.	Shrink	Total
<i>1,000-Pound Density Level</i>							
A	.128	.264	.014	.024	.031	.326	.78
B	.154	.270	.012	.024	.023	.375	.85
C	.200	.326	.012	.037	.018	.417	1.01
D	.217	.384	.012	.050	.017	.435	1.11
Average							.94
<i>5,000-Pound Density Level</i>							
A	.086	.196	.014	.010	.031	.230	.56
B	.090	.204	.013	.007	.023	.241	.57
C	.116	.221	.012	.009	.018	.276	.65
D	.131	.231	.012	.011	.017	.299	.70
E	.142	.254	.012	.016	.015	.327	.76
F	.159	.268	.012	.019	.015	.380	.82
Average							.68
<i>25,000-Pound Density Level</i>							
A	.073	.161	.011	.004	.031	.178	.45
B	.055	.165	.010	.003	.023	.228	.48
C	.063	.174	.011	.003	.018	.218	.48
D	.065	.175	.011	.003	.017	.229	.50
E	.074	.184	.012	.006	.015	.248	.51
F	.085	.193	.013	.008	.015	.275	.51
Average							.51

<sup>a</sup>Computed using data from Appendix Table E and back-dating the data using more vehicle, labor, and building material price indices from *Agricultural Prices, 1968 Annual Summary* (Washington: U.S. Government Printing Office, 1969).

**APPENDIX TABLE G**  
**Estimated Broiler Assembly Costs in Cents Per Pound**  
**Of Live Broiler for Six Firm Sizes at Three Density**  
**Levels, 1968<sup>a</sup>**

Firm	Truck	Labor	Crate	Car	Mgt.	Shrink	Total
<i>1,000-Pound Density Level</i>							
A	.170	.433	.016	.032	.050	.326	1.027
B	.205	.442	.013	.032	.037	.375	1.104
C	.267	.535	.013	.050	.029	.417	1.311
D	.289	.635	.013	.066	.028	.435	1.466
Average							1.227
<i>5,000-Pound Density Level</i>							
A	.115	.322	.016	.014	.050	.230	.747
B	.121	.334	.014	.009	.037	.241	.756
C	.154	.362	.013	.012	.029	.276	.846
D	.175	.379	.013	.015	.028	.299	.909
E	.189	.416	.013	.021	.025	.327	.991
F	.212	.440	.013	.026	.025	.350	1.066
Average							.886
<i>25,000-Pound Density Level</i>							
A	.097	.264	.012	.006	.050	.179	.608
B	.073	.271	.011	.004	.037	.228	.624
C	.084	.285	.012	.005	.029	.218	.633
D	.087	.286	.012	.005	.028	.229	.647
E	.096	.302	.013	.008	.025	.248	.692
F	.114	.317	.014	.010	.025	.275	.755
Average							.660

<sup>a</sup>Computed using data from Appendix Table E and updating the data using motor vehicle, labor, and building material price indices from *Agricultural Prices, 1968 Annual Summary* (Washington: U.S. Government Printing Office, 1969).

